transfund NEW ZEALAND
ARATAKI AOTEAROA

CONTRACT REPORTS
METHODS FOR DETERMINING THE BENEFITS OF SAFETY AUDIT. A SCOPING STUDY

Review and Audit Division
Report No. RA96/554S

Report No. RA96/554S AU1-0023

TRANSFUND NEW ZEALAND

CONTRACT REPORTS METHODS FOR DETERMINING THE BENEFITS OF SAFETY AUDIT. A SCOPING STUDY

Prepared By .....
Mike Gadd, Civil and Transportation Engineer, Christchurch

Reviewed By .....
Ian Appleton, Safety Audit Manager

Approved By .....
P V Wright, Review and Audit Manager

June 1997

PREFACE TO CONTRACT REPORTS

BENEFITS OF SAFETY AUDIT

This report is a compilation of 4 contract reports of a scoping study into methods of measuring the benefits of safety audit. These reports were not intended for publication. Instead, they fulfilled the reporting requirements of a contract between Transfund New Zealand and the consultant, Mike Gadd of Christchurch, New Zealand.

This work on the benefits of safety audit was started prior to the creation of Transfund New Zealand on 1st July 1996.

The work was exploratory by nature, and appears to be a world first. No other agency appears to have attempted such a study. Therefore, Transfund has decided to make these contract reports available to anyone who is interested in following the work, replicating it or building on it.

Transfund does not necessarily agree with all the statements and findings in these reports. It will not be held responsible for the contents. Readers should not rely solely on their contents but seek expert advice on their own circumstances.

This compilation of contract reports comprise:

- The Terms of Reference of the scoping study;
- **Stage 1** which used a focus group and surveyed the literature and world wide activity. The main objectives of safety audit were found to be (a) Minimising the risk and severity of crashes (b) Minimising the need for remedial works, (c) reducing the whole life costs of projects and (d) improving awareness of safe design practices. Included is a paper entitled "Review of Literature describing benefits of safety audit."
- **Stage 2** which evaluated the findings of stage 1 and recommended trials to be conducted as stage 3. Three types of method of assessment were explored: (a) Those relating to the process, (b) Those which are capable of numerical assessment and (c) those which are the subject of opinion. Included are: an appendix titled "Contributions from other authorities and authors"; copies of correspondence with overseas experts and a copy of a report "Road Safety Audit. An Investigation into casualty savings: Discussion Report." by The Highway Management Division of Surrey County Council, UK. This latter report is the basis of the "Surrey Method".

- **Stage 3** which carried out trials of the methods recommended in stage 2 using actual roading projects and real data, assessed each method and made formal proposals for future work. The following methods were explored: (a) the investigation of safety audits both as to compliance with procedures and thoroughness; (b) "The Corben Method" in which theoretical crash savings are ascribed to safety audit findings; (c) The "Surrey Method" in which crash data from a group of safety audited sites are compared to data from a similar group of unaudited sites; and (d) a survey to assess increased awareness of safe design practices.

- **Pilot Questionnaire:** As part of Stage 3, a pilot survey was conducted. This is reported separately.

These contract reports have been summarised in Transfund New Zealand Review and Audit Division Report No. RA96/550S "Summary Report. Methods for Determining the Benefits of Safety Audit." June 1997.

Copies of this summary report are available (free of charge) from:

Ian Appleton
Safety Audit Manager
Transfund New Zealand
P O Box 2331
Wellington
New Zealand

Comments on this scoping study are welcomed. They should be sent to Ian Appleton or the researcher, Mike Gadd:

Mike Gadd
2/63 Rountree Road
Christchurch
New Zealand.

RESEARCH BRIEF

Contract Reports. Methods for determining the benefits of safety audit. A scoping study
Final reports: 19 June 1997

RESEARCH BRIEF
BENEFITS OF SAFETY AUDIT

1. INTRODUCTION:

Safety Audit first introduced in the UK followed by Australia and New Zealand.

Several documents exist that describe the process of safety audit including TNZ *Safety Audit Policy and Procedures (*August 1993) and AUSTROADS *Road Safety Audit Guidelines*

Safety Audit was introduced in New Zealand after research overseas and trials on state highway projects. However there is no concrete evidence that safety audit does reap the benefits claimed for it. It appears to encourage good practice in designing for safety, but it has been introduced in New Zealand as an act of faith.

Also, there is no definition of where benefits may be looked for other than an inferred reduction in crashes on schemes which have had the benefit of safety audit. For instance, the training of designers to produce safer designs, or the development of standards where none exist.

It is incumbent on the proponents of safety audit to demonstrate that it does result in benefits, and if possible, where these benefits might be found.

There is an inherent difficulty in measuring the benefits of safety audit, particularly in the feasibility or design stages, because it is a programme of accident prevention, not one of accident reduction. There are no "prior" accidents to reduce. The accidents prevented are the hypothetical ones which would have occurred had a safety audit not been applied.

There is also, at present, no means of knowing if safety audit has identified all potentially unsafe aspects, nor can it be assumed that the "problems" have been dealt with.

The benefits of safety audit are listed in the *Safety Audit Policy and Procedures* (TNZ 1993) as:

> *"minimise the risk and severity of accidents that may be created by the road project at the site and on the adjacent network;*
>
> *minimise the need for remedial works after construction;*
>
> *reduce the whole life costs of the project; and*

improve the awareness of safe design practices."

2. OBJECTIVE

This research is exploratory in nature.

The objectives of this research are:

- To explore and explain what "the benefits of safety audit" actually means;
- To explore and, if possible, identify a number of ways in which these benefits might be measured either subjectively or objectively;
- To select a limited number of these ways and to expand on the data requirements needed for them;
- To pilot this limited number of ways to demonstrate the potential and to test the feasibility of a more extensive study;
- To recommend how any of these ways might be progressed further.

3. METHODOLOGY

3.1 Stage 1

As far as can be ascertained, research of the benefits of safety audit has not been carried out in any depth. The first step is to define what it is meant by the benefits of safety audit. These may be limited to the topics listed in the above extract from the *Safety Audit Policy and Procedures.* However, the definition of the benefits and possibly the scope of the project should be checked with a small group of safety auditors, designers and clients in a round table open discussion.

While potential accident savings have been quoted as evidence of the benefits of safety audit, the statistical basis of their derivation is open to question. They tend to gain credibility by being re-quoted. Another part of stage 1 is to enquire of the source of these numbers how they were derived.

There may be research under way at present to measure the benefits of safety audit of which we are unaware. To avoid duplication and going over old ground, a survey of a limited number of overseas "experts" in the field shall be undertaken to find out who is doing work in this area and what methodologies are being used.

Again, using a small group of safety auditors, designers and clients in a round table discussion, possible methods of measuring the benefits should be proposed. There should be no constraint on what methods are proposed. The discussion should focus on the meanings elicited at the previous discussion.

3.2 Stage 2

The next step is to evaluate the methods proposed in stage 1. For each method, the consideration should be given to at least the following:

- Has this method been tried elsewhere & was it successful?
- How well will the results reflect or quantify the benefits of safety audit defined in stage 1 ? - or will they be just a vague surrogate?
- What information is required?;
- Is that information readily available and in a form that is easily usable?
- Is the information objective or subjective ?
- Will it require a lot of effort on the part of other parties to get the information?
- Will it be expensive to get the information ?
- How long will it take to get the required information?
- Will there need to be a lot of sophisticated analyses ?
- How big a sample will be required to generate meaningful results ?

Based on these and any other considerations that are relevant to each proposed method, the research project should assess the feasibility of each method. The criteria for judging the feasibility should be described: The following are suggested criteria, but the researcher is not limited to these:

- Credibility of the results;
- Ease and expense of gathering the required information;
- Length of time to produce results.

From the assessment of their feasibility, the researcher shall recommend a short list of methods suitable for trialing at stage 3. If none is thought feasible, the project ends with the writing and presentation of a report

describing what has been achieved.

3.3 Stage 3

This stage will trial the methods deemed feasible at the end of stage 2, in discussion with the Safety Audit Manager. The trial is not intended to produce conclusive results, although these would, of course, be welcome. The purpose of the trial is to test the practicality of the methods.

Consideration must be given to the sample size required to satisfy this test.

At the conclusion of the trials, the feasibility of each method is to be re-assessed.

If one or more methods are deemed to be practical, then a formal proposal is to be made to the TNZ Research and Development Manager for this or these methods to be implemented.

4. RESEARCH TASKS

4.1 Stage 1

- Convene small group to define "Benefits of safety audit"
- Establish bases for published claims for benefits of safety audit.
- Contact sample of "experts" to find out if similar work is underway elsewhere.
- Convene small group to explore potential methods.
- Write brief report for the Project Manager

4.2 Stage 2

- Assess feasibility of each method suggested in stage 1
- Write brief report for Project Manager outlining feasibility of each method and making recommendations on which ones should be trialed at stage 3.
- Agree with project manager which methods will be trialed.

4.3 Stage 3

- Conduct trials of the methods chosen in stage 2.
- Write brief report to project manager recommending which trialed methods should proceed
- Write formal research proposal

5. TIMETABLE

Stage 1: 5 weeks: 26 February to 31 March
Stage 2: 6 weeks: 1 April to 12 May
Stage 3: 6 weeks: 13 May to 23 June

Stage 3 should be completed by 30 June 1996.

6. REVIEWS

There will be reviews at the end of each stage. These reviews may:

- Agree that the project cease; or
- Agree that this brief be amended for later stages and proceed to the next stage.

The review will consist of a meeting between the researcher and the project manager to discuss the latter's brief report of the stage just completed. The project manager may ask others to assist with the review meeting.

7. PERSONNEL

The Project Sponsor is Peter Wright, Review and Audit Manager, Transit New Zealand

The Project Manager is Ian Appleton, Safety Audit Manager, Transit New Zealand.

The Researcher is Mike Gadd, of 2/63 Rountree Street, Christchurch. The researcher may call on any other for advice or any other service. The cost of these extra persons must be contained within the budget.

There is no commitment on the part of the project manager that this researcher will undertake any research which might follow after stage 3.

8. BUDGET

The total budget for this project is $15,000. This is to cover:

- The researcher's fee plus disbursements;
- The fees and disbursements of others brought in by either the researcher or the project manager to assist in any way;
- Any other costs associated with the project excluding the project manager's costs.

Invoices may be submitted at the end of each stage.

9. REPORTING

Brief reports shall be prepared at the end of each stage. The purpose of the reports is to document the work done and make recommendations for the next stage.

It is not expected that these reports will be published or submitted to the TNZ Authority, though neither of these is precluded.

10. OUTPUT

If it is recommended that further research be done, then the output from this research will be a research proposal. Otherwise the output is only the reports as per paragraph 9 above.